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AN INTRODUCTION TO THE WORK OF THE
SOUTHERN FOREST EXPERIMENT STATION



1933

G. D. MARCKWORTH

473094

Cover Photograph

**Virgin stand of longleaf pine in
Jasper County, Mississippi.**

INDEX OF PRINCIPAL INVESTIGATIVE PROJECTS UNDER WAY AT THE
SOUTHERN FOREST EXPERIMENT STATION IN 1933

E. L. Demmon, Director.

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Introduction

Maintained by the Forest Service, United States Department of Agriculture, the Southern Forest Experiment Station serves in its forest research activities the States of Florida, Georgia, Alabama, Mississippi, Louisiana, southern half of Arkansas, and the timbered regions of eastern Texas and Oklahoma. The Station maintains headquarters in New Orleans, and field investigations are under way in various parts of the South.

In its investigations, the Southern Forest Experiment Station is seeking to determine the best methods of obtaining profitable growth and utilization of forests in the region. These investigations are a part of the national program of forest research, the purpose of which is to obtain a scientific foundation that will assure to the nation (1) an adequate future supply of timber and forest products, (2) the benefits of stream-flow regulation and prevention of excessive erosion through maintaining or replacing forest cover, and (3) the fullest and most profitable use of its forest land.

This illustrated volume has been compiled for the purpose of presenting graphically the outstanding aspects of the Station's activities. Although conclusions drawn from work already completed are sometimes stated, the purpose of this volume is not primarily the dissemination of experimental results. A partial bibliography of Station publications, found at the end of this volume, cites titles of publications that give the results of researches made by staff members. Further information regarding any phase of the work of the Station will be gladly furnished.

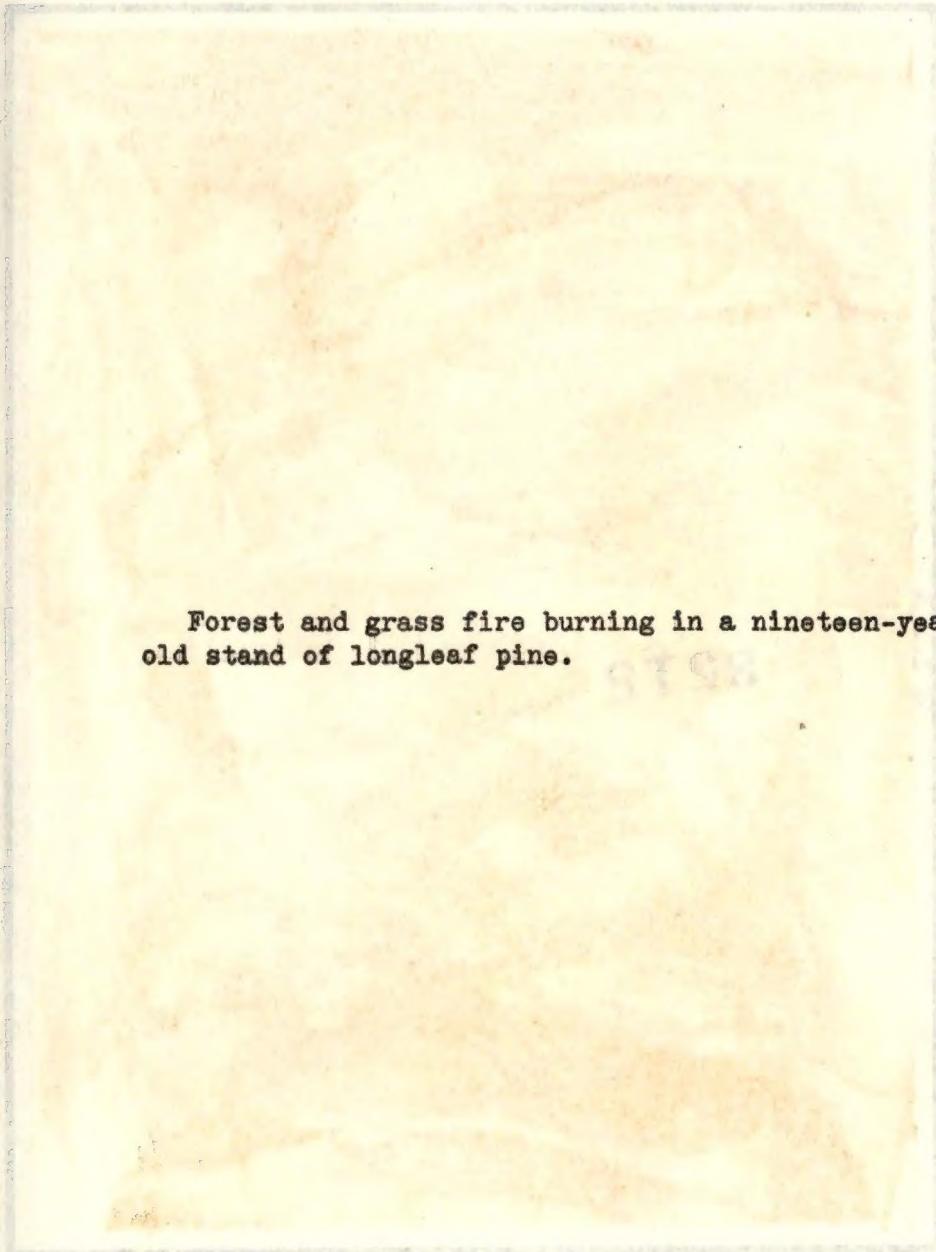
Fire

Foresters are concerned with all the factors that operate to destroy their forests. Of these, uncontrolled fire is one of the most dangerous. Uncontrolled fires during dry seasons often eliminate entire stands of young timber, and frequently cause loss to older trees. If properly controlled, fire may at times be a valuable tool. There is evidence of its usefulness in promoting natural reproduction of longleaf pine and lessening the hazard of heavy loss in conflagrations. Fire studies of the Southern Forest Experiment Station are making available basic information necessary in the solution of the forest fire problems of the South.

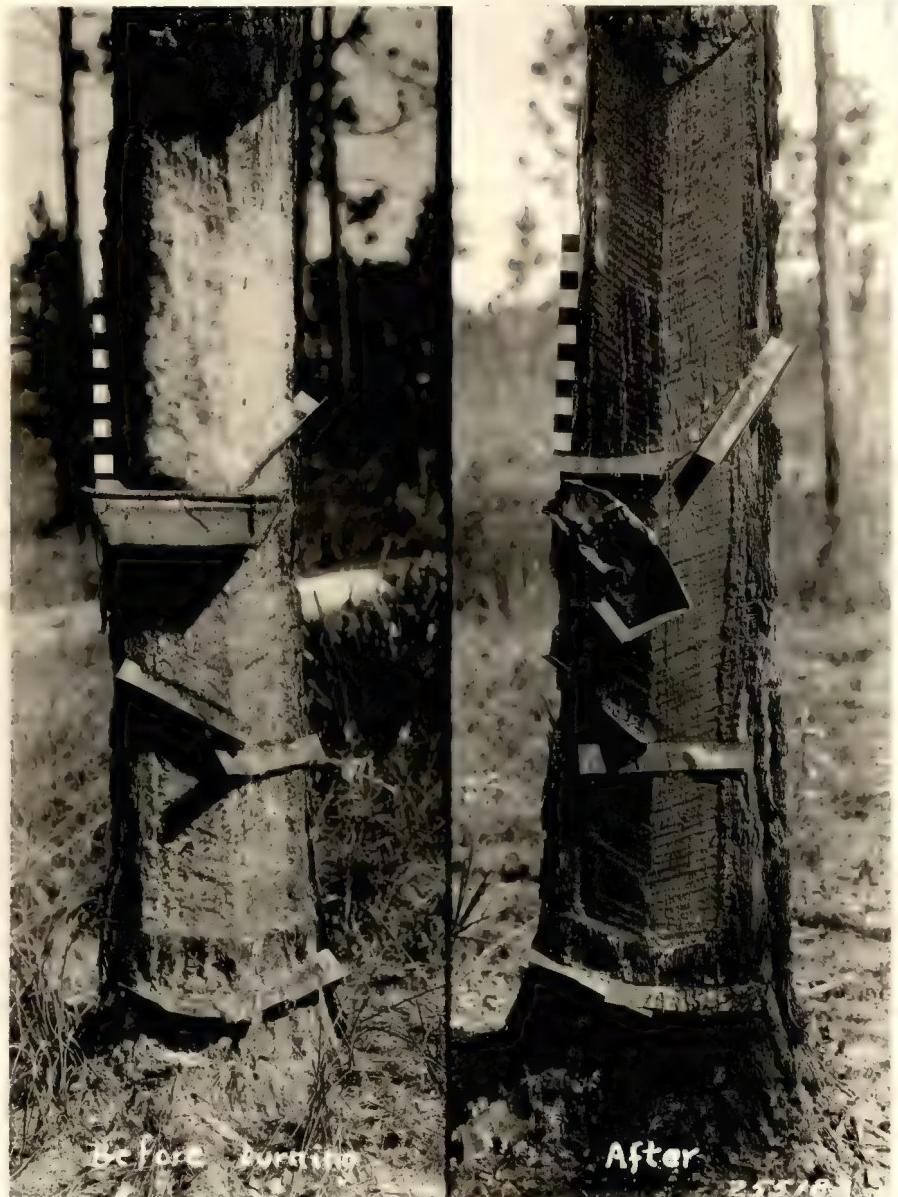
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Forest and grass fire burning in a nineteen-year-old stand of longleaf pine.



This picture shows the direct effect of fire upon the face of a turpentined tree. Not only is there a timber loss by burning, but there is also a heavy loss in cups and gutters. The destruction of the protective covering of gum leaves the tree susceptible to insect and rot attack.

Management

In principal, forest management is similar to farm management; the details only differ. The farm manager usually plants in the spring, performs a certain number of cultural operations during the summer, and harvests his crop in the fall. The forest manager usually prefers to so handle his forest that seed for the new crop is naturally disseminated from the trees of the old. When necessary, he is willing to sow seed in nurseries and plant the resulting seedlings on his forest area, thus producing the new crop of trees.

The cultural operations of the forest manager consist in thinning dense stands of young trees to encourage rapid growth on individuals, in removing diseased and defective trees from the stand, and in so modifying natural forces that a healthy, fast-growing forest of desirable tree species results.

The Southern Forest Experiment Station is carrying on a series of experiments to determine the best ways to secure natural reproduction of important tree species, the desirable ways in which to thin stands of varying age and composition, and effective ways of increasing quality and quantity growth.



Longleaf pine seedlings beneath a group of
seed trees.



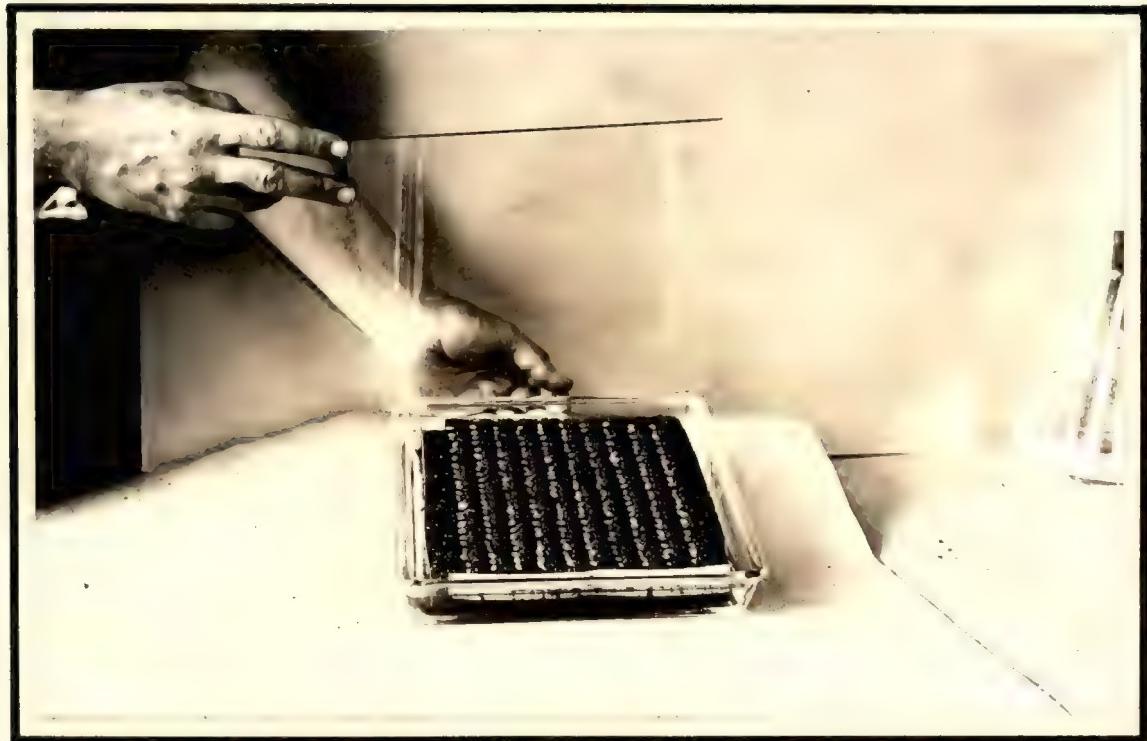
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A 25 year old stand of longleaf pine thinned to
200 trees per acre for production of turpentine.

Forestation

Forestation studies being made by the Southern Forest Experiment Station are devising new and improved methods of extracting pine seeds from cones, are perfecting ways of testing the germinability of pine seeds, are developing efficient forest nursery technique, and are assisting local agencies in the solution of their forest planting problems. For many years to come natural reproduction can not be expected on many denuded forest areas in the South. Forest planting permits the return of these lands to the productive class.



Testing the germinability of seed is one of the most important phases of the Station's forestation work. Sometimes the tests are made for the immediately practical purpose of learning the quality of the seed, and hence the amount to buy, or to sow in a seed bed of specified size. Again, the tests may be part of a more far-reaching study of the effect of kiln extraction, of cleaning, or of storage.

The compressed mat of acid peat shown on the opposite page, used to test the germinability of pine seed, is held in shape by a wire border, and has on its surface ten grooves or drills, each containing 25 seeds.

The peat-mat test is less time-consuming than the customary sand-flat test; the mats and the glass dishes which contain them take up less space, and weigh less, than the sand-flats; and the use of peat instead of sand removes sand and grit from the laboratory. The peat mats can be left for several days without watering if they are first saturated and then left with a slight excess of water in the dishes. A piece of glass over each dish reduces evaporation and protects the seeds from mice.



Slash pine seedlings, 7 months old, grown on the same soil and from the same lot of seed, but differing greatly in quality because of different densities in the bed.

(Above) Twenty seedlings per running foot in drills eight inches apart resulted in a high percentage of high grade stock. (Below) Thirty to fifty seedlings per running foot in drills four inches apart resulted in a high percentage of low quality stock.

Experiments and observations in many different nurseries have shown that density of the seedling stand is one of the most important factors affecting the grade of nursery stock. Good seedlings can not ordinarily be grown at densities of more than 30 - 50 per square foot, broadcast, or 15 - 20 per running foot of drill with drills six inches apart.

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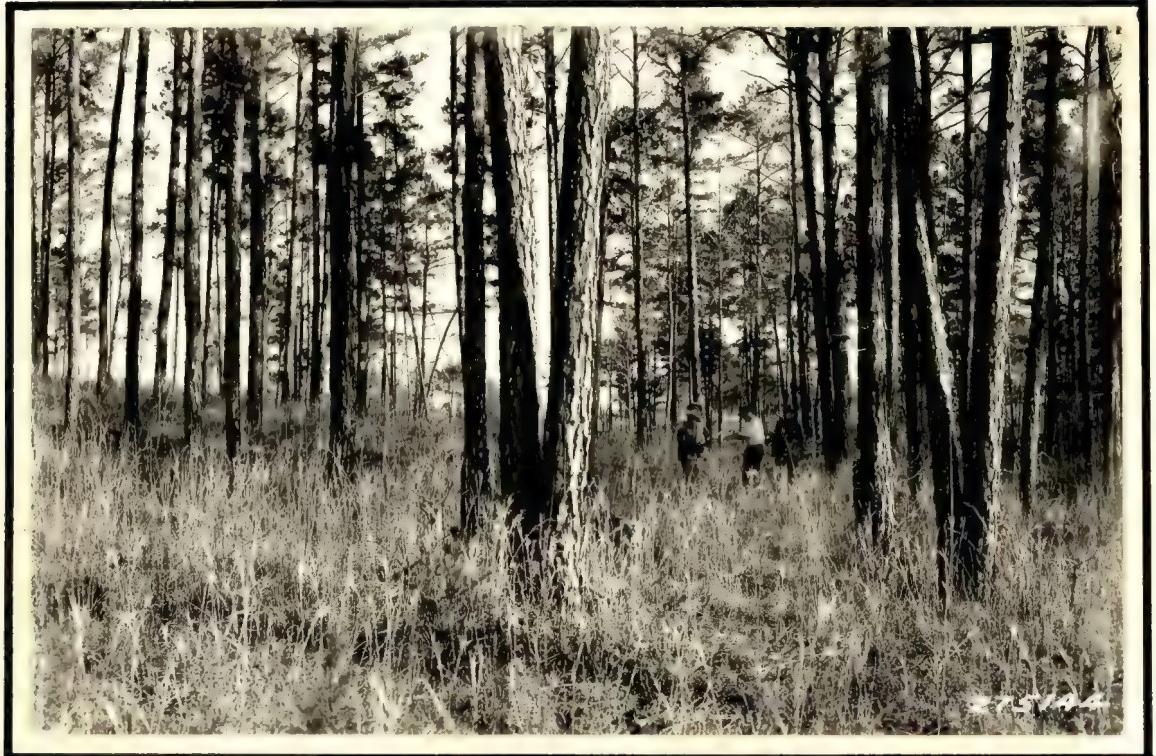


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A commercial plantation of slash pine, six years in the field and seven from seed. This particular plantation covers 700 acres, and is one of a series covering 28,500 acres. The cost of establishment of the plantation shown here was between \$3.50 and \$4 per acre (1925 prices).

Southern Pine Growth and Yield

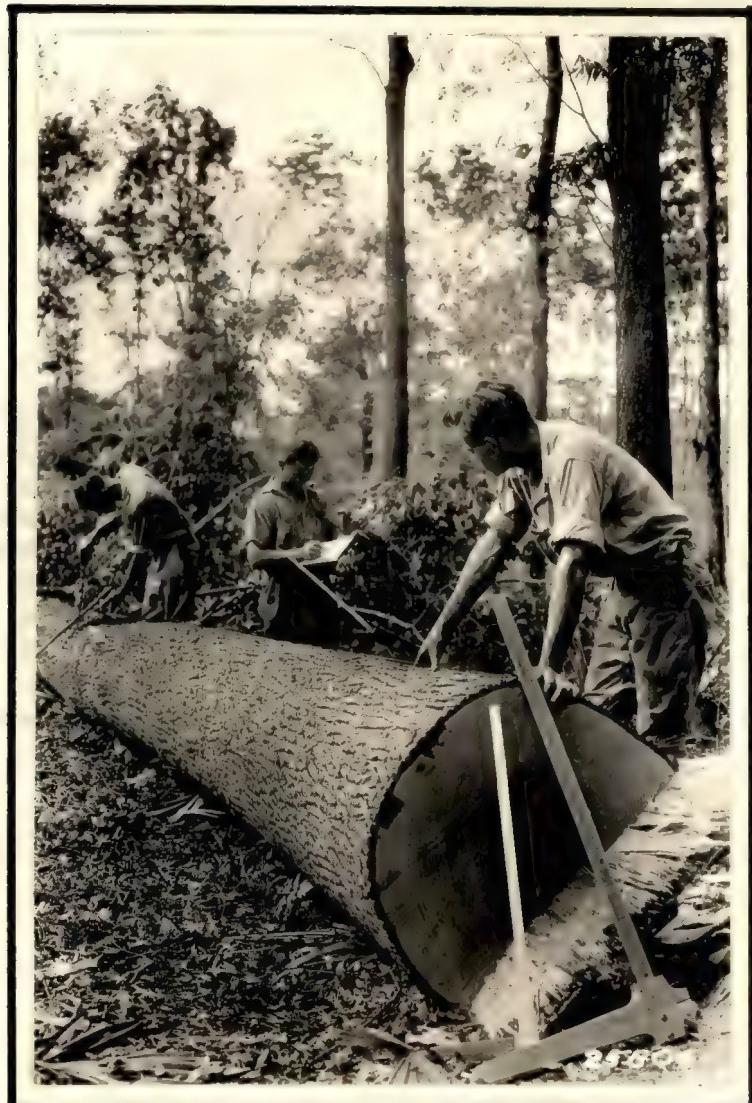
Since forest profits in a measure depend upon forest production, knowledge of the yield capacity of forest land is important to the forest manager. Growth studies of southern pines grown in dense second-growth stands have been completed by the Southern Forest Experiment Station and are now available as Miscellaneous Publication No. 50 of the United States Department of Agriculture. The growth rates of southern pines in open stands have yet to be determined and correlated with the corresponding growth rates of full stocked stands to determine the influence of stocking on growth.



Second-growth shortleaf pine, 45 years old, on an excellent site (site index 80). The average tree diameter is approximately 11 inches, and the stand has a volume of more than 7,500 board feet per acre.

Hardwood Growth and Yield

The perpetuation of supplies of high-grade hardwood timber growing in the Delta region of the Mississippi River depends upon wise use of the present virgin supply and a knowledge of the rate of growth of the young hardwood stands. Studies of the growth rates of second-growth hardwood in this region are attempting to demonstrate the practicability of producing hardwood timber as a crop on lands where tax rates and logging costs are not prohibitive.





264890



Field men measuring a second-growth red gum tree to ascertain its merchantable contents.

Eighty-year-old red gum stand growing
on an abandoned field. A 1/2-acre plot
established in this stand bore approximately
12,000 board feet of timber in logs of more
than 10 inches top diameter.

Naval Stores

Early American colonists employed the pitch and tar obtained from some of the southern pines in waterproofing wooden sailing vessels. These products were among the first exports from the young American colonies and gave rise to the term "naval stores," which appellation still clings to the industry whose principal products are turpentine and rosin.

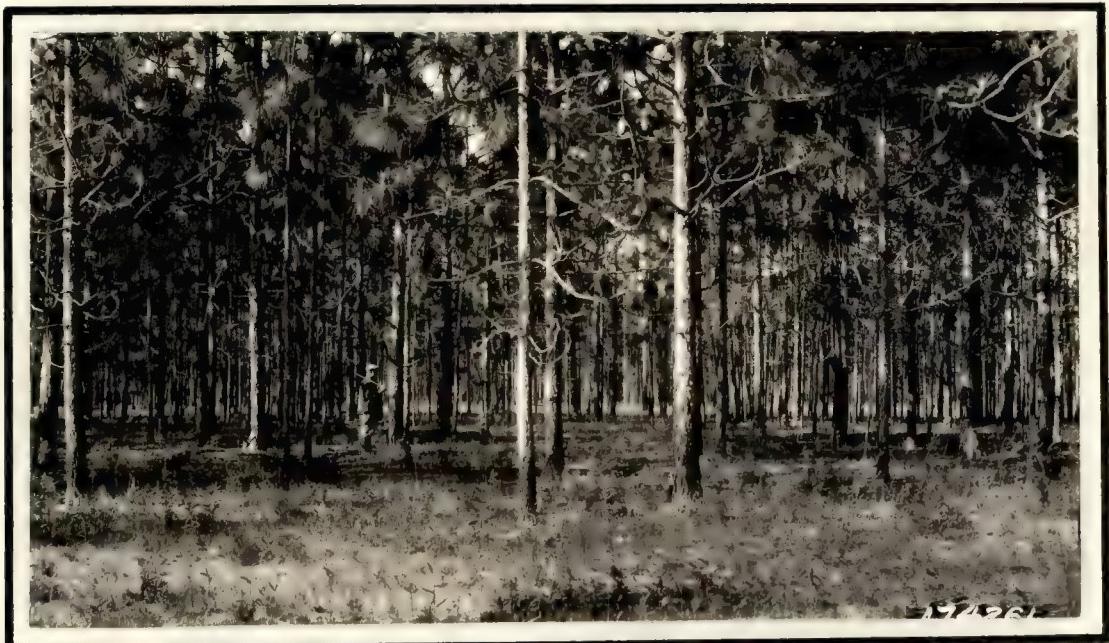
Stands of virgin longleaf and slash pine timber, formerly thought necessary for the naval stores industry, have practically disappeared, and efficient methods of obtaining the crude gum from second-growth stands must be perfected if the naval stores industry is to perpetuate itself. Naval stores experts attached to the staff of the Southern Forest Experiment Station are devising improved methods of obtaining gum from the trees, and are developing new methods of stand management to the end that maximum gum yields will result.



Gum is collected into "dip" buckets which when full are emptied into "dip" barrels. These are then loaded on wagons and hauled to the still where the crude gum is distilled into turpentine and rosin. A "woods rider" supervises all woods operations. The normal chipping season in the turpentine woods is 32 weeks, and usually begins early in March. Note on the trees in the foreground the arrangement for cupping the trees and the formation of "scrape" (crystallized crude gum) over the length of the faces.



174260

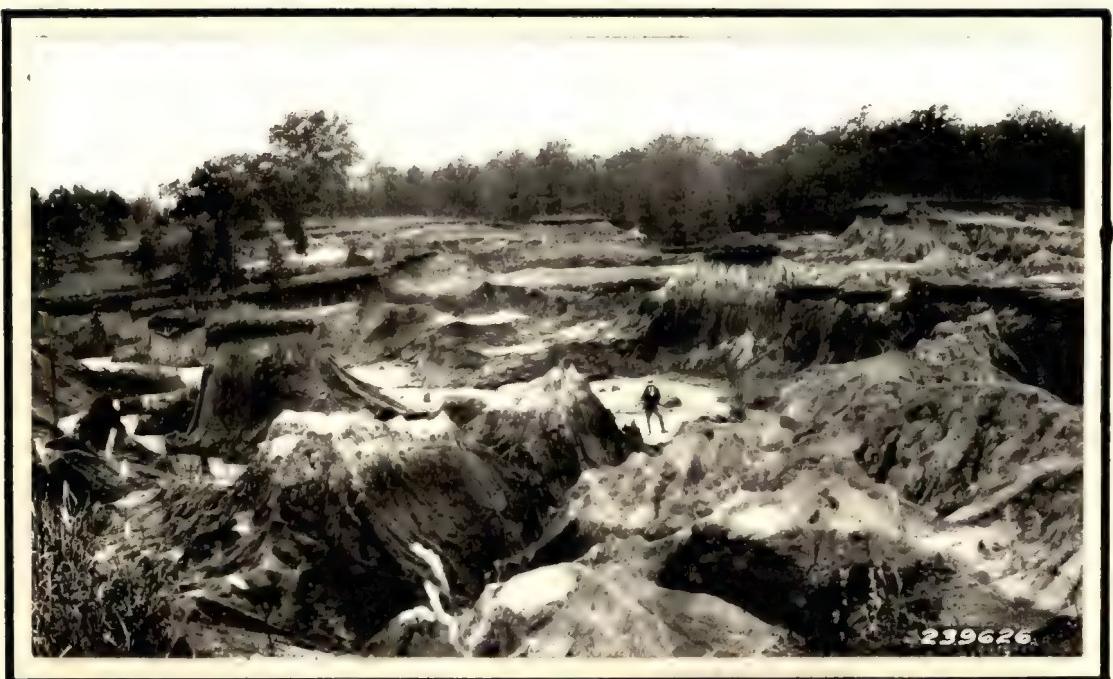


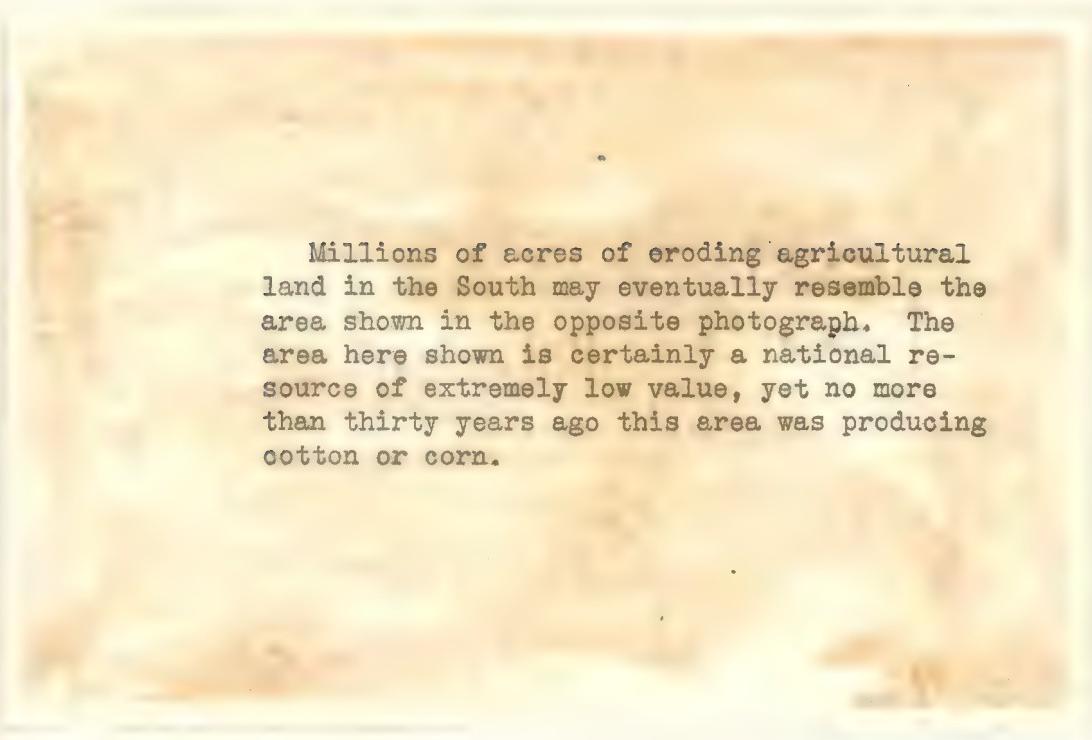
Naval stores trees must have large crowns and be of fast growth to give maximum yields of gum. Longleaf pine trees in stands like this produced annually an average of 40.4 barrels of turpentine per 10,000 faces.

Trees of similar diameter in stands of this density produced annually only 27.9 barrels of turpentine per 10,000 faces.

Erosion

Land clearing in certain parts of the South frequently results in serious loss of arable land through the "washing" of fertile topsoil and the formation of deep and sterile gullies. Experimental results clearly show that full forest cover prevents these losses. Careful study is necessary to reveal the conditions under which this protective cover can safely be removed and the land put to other uses, and to show the most effective and economical methods of controlling "land washing." These and other pertinent studies are being made by staff members of the Southern Forest Experiment Station.





Millions of acres of eroding agricultural land in the South may eventually resemble the area shown in the opposite photograph. The area here shown is certainly a national resource of extremely low value, yet no more than thirty years ago this area was producing cotton or corn.



In the early stages of the erosion cycle, the construction of wire and brush dams and the planting of young trees are effective control measures. On many areas the development of incipient gullies has been checked by the growth of a young forest stand.

Financial Aspects of Private Forestry



264882



In democratic America, the social prestige so common in Europe does not generally accrue to the holder of large estates. As a result, the holders of large areas of wild land expect a profit on their land investments. Many holders of virgin timberland feel that their best interests are served if they "squeeze" from their timber holdings every vestige of present value and discard the remainder for whatever salvage value may be realized. Others are turning hopefully toward the production of timber as a crop. Forest economists at the Southern Forest Experiment Station are engaged in studies to determine where and under what forest and economic conditions private forestry promises to be profitable, and where and under what conditions it is likely to prove unprofitable.

This land has been abandoned by the owner:
it yields no taxes, produces no crops, gives no
employment; it is an economic desert.

This land has produced a new crop of timber
because it has been cared for by the owner: it
pays taxes and gives employment in the woods,
in the mill, and in the commercial establish-
ments and businesses dependent upon an employed
population: this is an example of private
forestry on a profitable basis.

New Public Domain

Of the estimated 15 million acres of land that, owing to delinquent taxes, have reverted to public ownership in the Southern States, approximately $9\frac{1}{2}$ million acres are forested. The removal of this considerable land area from the local tax rolls imposes a hardship on the citizens whose annual tax must be increased in order to meet this deficit. To safeguard the interests of local and State governments, the fundamental causes producing this land reversion to public ownership must be ascertained and remedial measures suggested. To this end the Southern Forest Experiment Station has instituted the "New Public Domain" study.

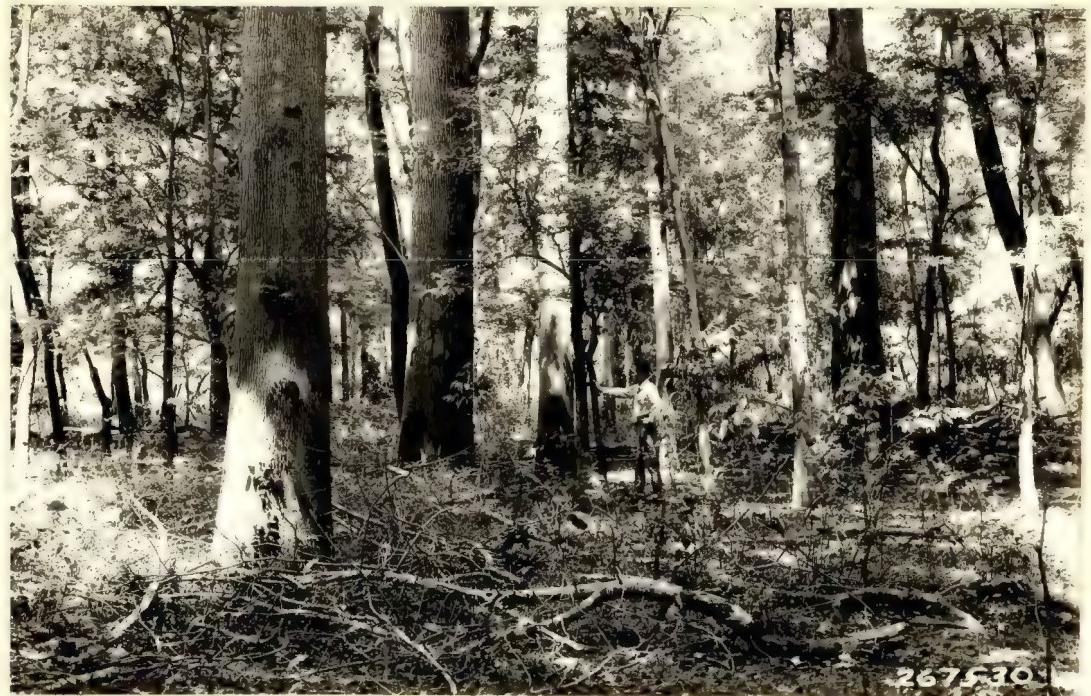


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The poor quality of the agricultural land in the foreground of the photograph on the opposite page has caused its reversion to State ownership for delinquent taxes. The shortleaf pine woodlot in the background has helped to pay the taxes on the adjoining farm.

Forest Survey

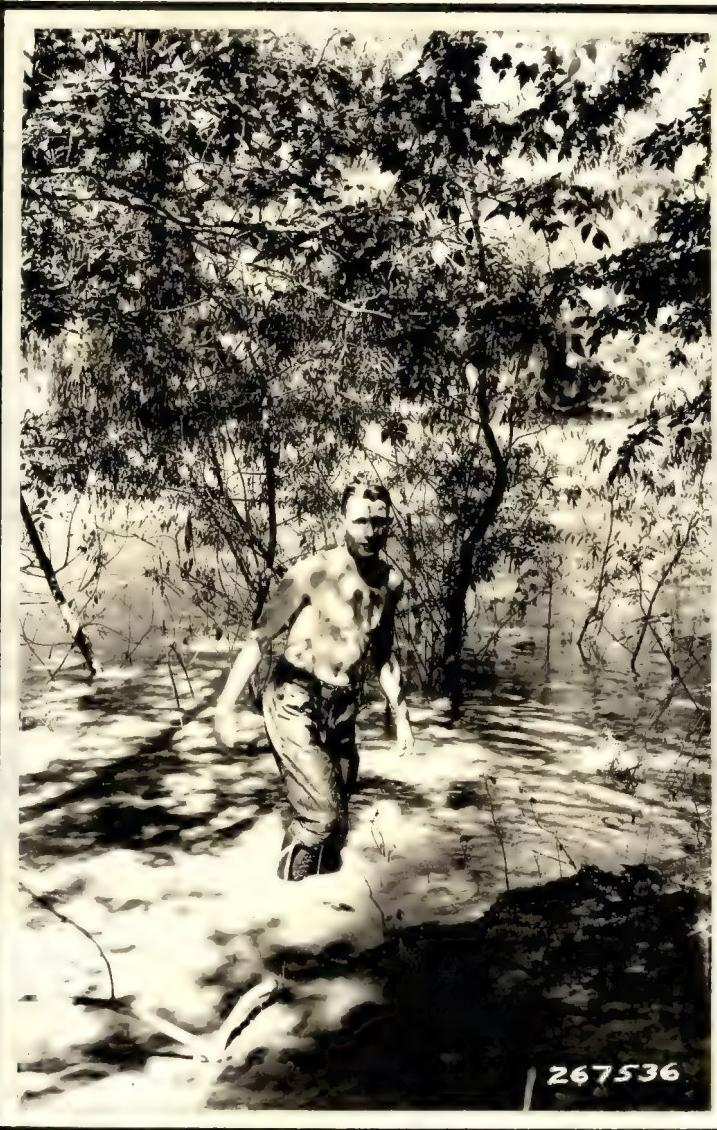
The anticipated future timber needs of America must be balanced against the estimated future supply in order to evolve a rational timber production program. Information necessary in the formulation of this program is being obtained by the United States Forest Service through the nationwide forest inventory, of which the Southern Forest Survey is but a part. The Southern Forest Survey, a part of the Southern Forest Experiment Station organization, is determining the extent of our present timber resource, its rate of growth, the present rate of its depletion, and, after careful study of trends in wood consumption, will estimate the probable future demand for wood.



267530

A stand of virgin red gum on the "batture" land of the Mississippi River. Virgin timber stands may be small in aggregate area, but owing to their heavy stands per acre, the total amount of virgin sawtimber is often more than the sawtimber on all the areas classed as culled or cut-over.

The virgin hardwood timber areas are relatively free from brush and briars; the shade from the towering red gum, oak, and water hickory trees usually prevents their formation. In the Delta region of Mississippi, 5½ per cent of the forest area was classed as virgin timber.



The party chief swims a river to locate the starting point for the day's work. The crews of the Forest Survey follow a true compass course regardless of the hazards and difficulties encountered. Swamps have to be waded, bayous and streams crossed, and occasionally a bayou or river must be swum. Such work, day in and day out, requires men with sturdy constitutions and with a woodsman's sense and resourcefulness.

Forest Pathology

(Bureau of Plant Industry)

In the Southern States the problem of longleaf pine reproduction, both natural and artificial, has been complicated by a little-known needle disease, *Septoria acicola*, commonly called "brown-spot." Records maintained over several years have shown that the disease retards the early growth rate of the pine seedlings and reduces the probability of their successful establishment. Repeated experiments by the Bureau of Plant Industry, cooperating with the Southern Forest Experiment Station, in both nurseries and plantations have demonstrated that the disease can be controlled by spraying. These experiments have determined spraying materials suitable for use and the times of year at which spraying can be done effectively.

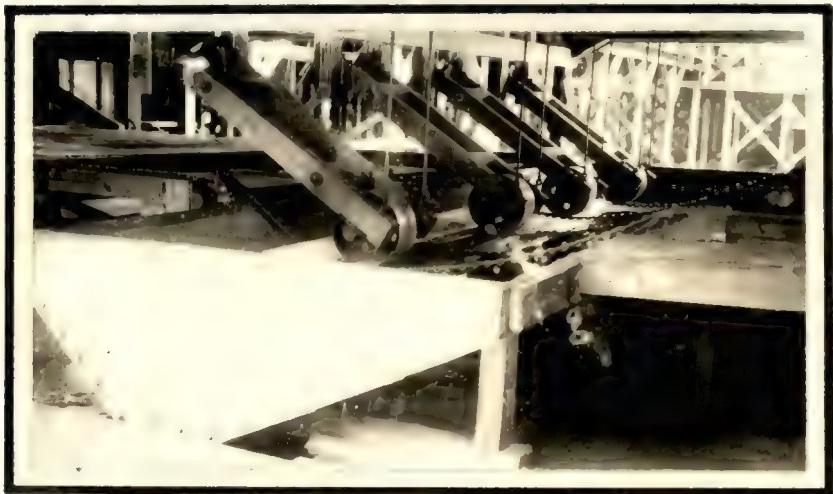


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The vigorous longleaf pine seedlings shown in the opposite photograph have developed through control of the brown-spot needle disease by spraying for three consecutive seasons. Note the number of thrifty seedlings in the foreground that are ready to start height growth.

Products Pathology

(Bureau of Plant Industry)



The lumber industry of the South suffers heavy annual losses through lumber stains and wood decay. These losses are caused by minute organisms called fungi that develop and live on wood products. The Bureau of Plant Industry of the United States Department of Agriculture is cooperating with the Southern Forest Experiment Station in devising practicable means of controlling the stain and decay fungi and reducing the industrial losses caused by their activity.



New and effective chemical treatments for the control of stain and mold in lumber have recently been developed, and have been widely adopted by both pine and hardwood manufacturers. The smaller mills hand-dip their lumber in small wooden vats such as the one shown in the upper photograph on the opposite page. The larger mills apply the chemicals by means of an automatic dipping vat shown in the lower photograph opposite. As the lumber passes along the conveyor chain it is automatically immersed in the treating solution for a period of approximately eight seconds.





The badly stained sap gum boards on the left show what happens when lumber of this species is not treated prior to seasoning. The bright boards on the right were dipped in a 0.24 per cent solution of an ethyl mercury chloride preparation.

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